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RELATION OF THE CHIRPING OF THE TREE CRICKET (OECANTHUS NIVEUS) TO TEMPERATURE.

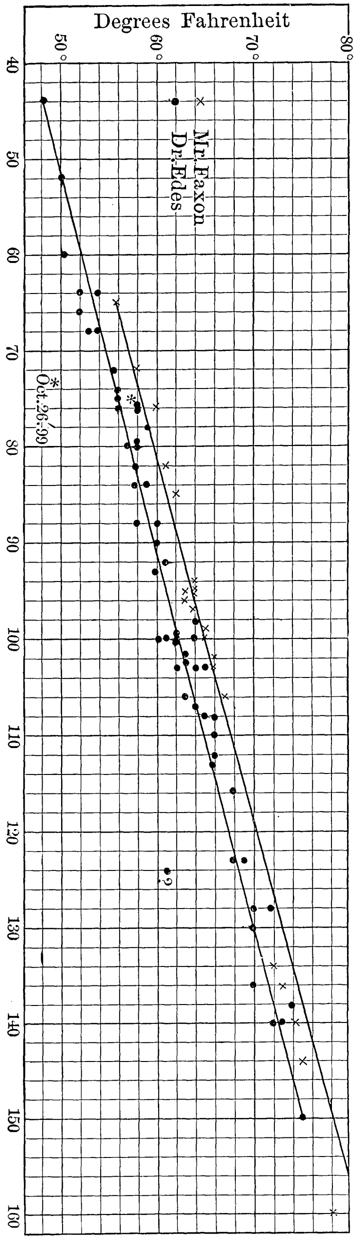
ROBERT T. EDES.

AMONG the shrill insect notes of the late summer and autumn nights, that of one of the crickets is easily to be distinguished from the others by a little attention, on account of its persistency and regularity. From nightfall until nearly daylight his monotonous chirp continues, affected only by weather and temperature, giving one the impression of a close attention to business entirely foreign to the character of careless freedom and irresponsible joyousness attributed to his kindred by the poets from Anacreon down.

Dr. Holmes alone seems to recognize in that "testy little dogmatist," the katydid, one of the same order of insects, a certain tenacity of purpose such as is appropriate to a resident in a less luxurious climate. It would be interesting to know whether this very positive insect is amenable to changes of temperature as quickly as his humbler cousin. In spite of the alleged use made of his relative the "black cricket," by Brian O'Lynn in the song, our friend is not the same personage at all; neither is he the "cricket on the hearth," although Keats recognizes in the latter a susceptibility to the same influences.

> On a long winter evening when the frost
> Has wrought a silence, from the stove there shrills
> The cricket's song, in warmth increasing ever.

As I am informed by Mr. Walter Faxon, the tree cricket (*Oecanthus niveus*) is the source of this persistent and rhythmical stridulation, being much more easily heard than seen, as he lives in leafy shrubs and stops his music when approached too closely. Hence the reader is referred to the Century Dictionary and works on entomology for a description.



CHIRPS OF TREE CRICKET PER MINUTE.

A few years ago a note appeared in the *Boston Transcript* calling attention to the very exact dependence of the rapidity of the chirps upon the temperature of the surrounding atmosphere and giving a formula therefor.

In the *American Naturalist* for 1897, p. 970, may be found a brief article, by Professor A. E. Dolbear, also giving a formula, possibly the same. Professor Dolbear makes a claim for synchronism among many individuals which I have not observed, and attributes the phenomenon which he notes rather to the influence of temperature upon the whole orchestra than upon each performer. He says: "An individual cricket chirps with no great regularity when by himself, and the chirping is intermittent, especially in the daytime. At night one may hear all the crickets in a field chirping synchronously."

It seems to me that he may have been deceived by observing two different species, for the tree cricket does not say much in the daytime, but I have certainly located the noise so closely, within a few feet, that I am sure that only one insect was concerned in making it, and it lasted with perfect regularity within several minutes.

Whether the same individual kept it up all night I am unable to say. For several evenings together and for several hours in the same evening I often got a series of chirps from what I suppose to have been a single individual in the same vine.

As to the synchronism, it is true that several performers may be audible at the same time, but the intensity of sound increases rapidly as the individual is approached, so that when all are performing in the same *tempo* the nearest one gives the accent without all the others emitting their notes at exactly the same instant.

Professor Dolbear's formula is as follows:

Let T = temperature in degrees Fahrenheit; N = number of chirps per minute; then

$$T = 50 + \frac{N - 40}{4}.$$ This would give 100 chirps for 65°.

During some weeks this summer I have recorded a number of observations, amounting, with those taken in previous years, to fifty-six, and Mr. Faxon has kindly sent me a series taken by himself.

All three sets and formulæ agree as to the rate of increase, *i.e.*, four beats to a degree, but mine differ from the other two in making the absolute value either two or three degrees lower, as will be seen in the accompanying diagram, in which I have indicated the separate observations of Mr. Faxon and myself, as well as in the tables.

It will be seen that in one-fifth the rule is exact for either 62° or 63° to the hundred, and in four-fifths the error is one degree or less.

One Hundred Chirps Corresponding to	62°	63°
Exact	11	11
Error 1° or less	29	29
Error 2° or less	10	12
Error 3° or less	5	3
More than 3°	1	1

I have little doubt that the errors would be even less if my methods of observation had been more accurate, *i.e.*, chiefly if the thermometer had been in the immediate neighborhood of the performer instead of being on the other side of the house from the vine, whence many of the notes were taken.

It would be very interesting to see whether our "snowy tree cricket" could be induced to give a chamber concert like his black cousin on the hearth, and to try whether an artificial change of temperature would change the rapidity of the music.

To physicians and nurses some interesting comparisons with the rhythm of the pulse as affected by temperature in febrile diseases will be suggested.